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REMARKS

Claims 1-14 were pending and considered by the Examiner. In an Office Action designation as Final, each of claims 1-14 has been rejected under 35 USC 102(b) as being anticipated by U.S. Patent 5,677,716 (Cleveland).

It is respectfully submitted that Cleveland does not teach or suggest the present invention, and the Examiner is respectfully requested to consider the following comments, remove the rejection and allow claims 1-14.

Cleveland discloses a maximum-diagonal print mask and multi-pass printing modes for a high quality and high throughput printing with liquid based inks. The process is suitable for scanning thermal ink jet machines. A problem recognized in the background of the patent is that, to achieve vivid colors with aqueous inks, ample quantities of ink must be deposited, and subsequent removal of the water base by evaporation can be time consuming. Bleed-through, smearing and problems such as cockle and puckering associated with paper shrinkage during drying can occur with the use of ample quantities of ink. Heating the inked medium can accelerate evaporation, but deformation of the medium from warping is a problem, especially with glossy stocks (column 1, lines 39-67). Preheating the sheet can result in a thin, arched gap of reduced color density (column 2, lines 19-23). Print mode variations have been used in which the ink is applied in numerous passes so that some ink drying occurs even before a specific character or image is completed. Cleveland discusses prior solutions in which so called "checker board" printing is used in which every other pixel location is printed in one pass and the unprinted pixels are filled-in in a second pass. Various other known rotating print mode masks are discussed. Another problem mentioned in the Cleveland patent is end-of-image print-medium advance errors (column 3). As the end of a sheet is reached, rollers holding the medium taut lose control of the sheet and print quality therefore can change.

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The primary focus of the Cleveland teaching is enhancing image quality throughout the medium. Cleveland proposes use of a different printing pattern so that ample quantities of ink can be deposited. Cleveland teaches scanning the printhead repeatedly along a pen-scanning axis that is substantially orthogonal to a printing medium advance axis (column 10, lines 50-52).

Unprinted regions are left in a first pass and are filled in subsequent passes. Heating can be used between passes to promote drying. Other aspects of the Cleveland teaching include multi-pass printing wherein at least 2 ink drops are deposited at each pixel location that is to be inked, and firing at most one third of the nozzles at any one time (column 13, lines 13-22). Cleveland's teaching for the end-of-page print defect problem is simply to advance the sheet by only half the normal advance distance as the page end is reached, and at the final printing to hold the sheet steady as multiple passes are printed.

The Examiner has repeatedly referred to several sections of the Cleveland patent, about which Applicants offer the following comments:

Column 1, lines 26-36. In this description of the field of the invention, Cleveland simply identifies that the invention described relates to printing devices for printing on different types of media, including transparency stock and other glossy media particularly with scanning thermal inkjet printing techniques. Cleveland identifies that the invention is to promote optimization of image quality. No specific solutions, structures or techniques are mentioned in this section.

Column 3, lines 10-42. In this section, Cleveland acknowledges the problems associated with end-of-print-medium advance errors, as the print medium is released by roller pairs that hold it taut. Reference is made to mitigating the errors by taking smaller steps in the print medium advance.

Column 14, lines 52-59. All that is stated in this section is a brief description of the drawings, and reference to "bottom-of-page handoff space rotation with one-sixth advance," and "sweep rotation to enable suppression of advance of the sheet in that region."

Column 23, lines 30-65. This appears to be Cleveland's primary discussion about the top/bottom of page mask rotation method. All that is discussed with respect to sheet advance is that "the print medium advance height is lowered to half (Fig. 2c) its normal midpage value (Fig. 2b)." (Column 23, lines 37-38, emphasis added). As an example, Cleveland states that in a preferred embodiment each pen has 96 nozzles creating a 96 pixel swath. The normal advance is one third, or 32 pixels. When the end of the medium is reached such that the tension cannot be maintained, the advance is halved to 16 pixels. In the final printing zone consisting of a single swath, no advance occurs.

Column 24, lines 1-13. This passage recognizes that space rotation would require the pen to skim partly on and partly off the sheet at the end of the page. To address this problem, Cleveland teaches changing from space rotation to sweep rotation, changing the inking pattern between pen scans. At the end of the sheet the system makes the transition to one sixth advance (from the normal one third advance) and only half of the nozzles print, with the mask being space rotated. When the final data is reached, advance halts and the remaining two passes are flushed out, with firmware sweep-rotating the mask.

It is respectfully submitted that none of these passages, not Cleveland as a whole, teach or suggest the present invention. Independent claims 1 and 11 each recite that, as the end of a page is approached, the method includes:

advancing the print medium in said advance direction a fixed minimum reliable move amount".

As the term implies, this distance is the minimum distance that the sheet can be advanced reliably, taking into consideration inaccuracies of the drive mechanisms. Thus, as stated in the present application:

"More particularly, because of possible errors associated with the rotation of the feed rollers advancing print medium 12, there is a minimum reliable move amount which print medium 12 must be moved in an advance direction 18." (Application, page 5, lines 10-12).

This can be contrasted with the teaching of Cleveland, which simply decreases the normal advance by one-half as the end of the page is approached. Since the normal advance distance can vary depending on the print mode and media being printed, Cleveland would vary the advance at the end of a page depending upon the print mode and the type of medium being printed. In the example discussed above, Cleveland specifically excepts transparency printing, and decreases the advance from 32 pixels (normal) to 16 pixels. In the discussion of printing transparencies, six-pass printing is recommended, with normal advance being sixteen rows (Column 18, lines 25-37). Decreasing the normal advance by half results in an advance of eight rows when the end of page is approached.

When the distance remaining at the end of the page is insufficient to advance one-half the normal advance amount, Cleveland stops any further advance, and completes printing without advancing the sheet.

Clearly, Cleveland teaches that at the end of the media, media advance is changed simply to one-half of whatever the normal advance distance is for the media being printed and the print mode performed. In contrast, in accordance with the present invention and as recited in the independent claims, the advance is decreased to a "fixed minimum reliable move amount" as the end of a page is reached. The media is advanced a reliable distance, but a minimum reliable distance. The media continues to advance the "fixed minimum reliable move amount" until insufficient distance remains for any further advance of a "fixed minimum reliable amount". As compared with Cleveland, the present invention enables reliably accurate multi-pass printing nearer to the bottom of the page.

Cleveland does not even recognize that there is a minimum fixed distance that the sheet can be advanced reliably. Cleveland merely decreases the advance distance to one-half of the normal advance distance for the operation being performed, which is not a fixed, but instead a variable distance. This advance distance in all likelihood and practicality is substantially more than the fixed minimum reliable move amount of the typical printer. Thus, normal multi-pass printing is not performed as near to the end of the sheet as in the present invention.

Applicants respectfully submit that independent claims 1 and 11 recite an invention neither anticipated by nor obvious from the teaching of Cleveland and should be allowed. Claims 2-9 depending from claim 1, and claims 11-14 depending from claim 10 should be allowed in that they each depend from allowable base claims. However, it is further submitted that the dependent claims recite features also different from the teaching of Cleveland, and are thus separately and independently allowable.

Claims 3, 4, 5, 8, 12 and 13 specifically modify the method based on remaining print area relationships to a minimum reliable move amount. Cleveland does not even recognize the

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existence of the minimum reliable move amount, and therefore makes no adjustment with respect thereto.

It is respectfully submitted that the cited portions of Cleveland and indeed Cleveland as a whole does not teach the existence of a minimum reliable move amount nor adjustment of the printing process at the end of the page utilizing a minimum reliable move amount. In several comments on the claims, the Examiner has referred to features as "inherent". It is respectfully submitted that the features of these claims cannot be inherent when all that Cleveland teaches is to decrease by half the normal advance amount, and subsequently terminating the advance amount. In contrast, the present invention adjusts as the end of a sheet is approached, to finally advance by "a minimum reliable move amount".

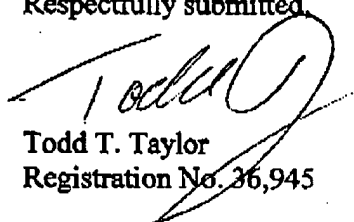
It is respectfully requested that the Examiner consider these comments, and remove the rejection of claims 1-14 as being anticipated under U.S.C102B by Cleveland. It is respectfully submitted that all claims are in condition for allowance, and an indication of such is respectfully requested.

In the event Applicants have overlooked the need for an extension of time, an additional extension of time, payment of fee, or additional payment of fee, Applicants hereby conditionally petitions therefor and authorizes that any charges be made to Deposit Account No. 20-0095, TAYLOR & AUST, P.C.

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Should any question concerning any of the foregoing arise, the Examiner is invited to telephone the undersigned at (260) 897-3400.

Respectfully submitted,



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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being transmitted via facsimile to the U.S. Patent and Trademark Office, on: December 4, 2003

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Name of Registered Representative



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Date